



----- EXHIBIT A -----

# 3M Copper Conducting Tapes, Code 1181 and 1182



## Copper Foil with Conductive Adhesive - More Information

### Product Description for Code 1181

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3M 1181 Tape consists of a 1-ounce deadsoft copper foil backing and a unique electrically conductive pressure-sensitive acrylic adhesive featuring the following:

- Deadsoft 1-ounce copper foil backing
- Conductive acrylic adhesive
- Supplied on a removable liner for easy handling and diecutting

Like other 3M shielding tapes, 3M 1181 is available in standard widths and as offered by SPI Supplies but it is also available in other widths and lengths up to approximately 36 yards.

### Applications:

3M 1181 Tape is typically used for applications requiring excellent electrical conductivity from the application substrate through the adhesive to the foil backing. Common uses include grounding and EMI shielding in equipment, components, shielded rooms, etc. The copper foil backing is solderable and resists oxidation and discoloration.

### Shielding Effectiveness

Many factors determine the true shielding effectiveness of a shielding tape, including type and thickness of foil, adhesive type, intimacy of contact, smoothness of application surface, strength and frequency of the EMI signal, etc. However, using standard tests and fixtures, it is possible to determine a value for the attenuation.

For 3M 1181 Tape, typical shielding effectiveness (far field) is in the range of 60dB to 80dB (30 MHz to 1 GHz).

### Product Description for Code 1182

3M 1182 Tape consists of a 1-ounce deadsoft copper foil backing that is coated both sides with and a unique electrically conductive pressure-sensitive acrylic adhesive featuring the following:

- Deadsoft 1-ounce copper foil backing
- Conductive acrylic adhesive on both sides
- Supplied on a removable liner on both sides for easy handling and diecutting

Like other 3M shielding tapes, 3M 1182 is available in standard widths and as offered by SPI Supplies

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but it is also available in other widths and lengths up to approximately 36 yards. Let us know your custom requirements so that we can offer pricing.

**Applications:**

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3M 1182 Tape is typically used to bond two surfaces together, both electrically and physically. An example would be adhering a conductive gasket to a conductive surface as part of an EMI shielding solution for electronic enclosure.

**Conductivity**

Since 3M 1182 double sided copper tape would typically be used as an electrical path between two surfaces, its most important feature is its conductivity. Highly conductive particles in the acrylic adhesive provide a multitude of electrical paths between the application substrate and the surface of the copper foil on each side. The resistance of the conductive path through the adhesive (measured over a 1 in<sup>2</sup> area) typically measures only a few milliohms.

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